NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA

SURATHKAL, MANGALORE - 575 025

Course Code – CS254

Course Name – Database Systems Lab

Lab - 02

Date – February 2, 2022

Submitted To

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1. Build a database of hospital management systems. The database should have the information about –

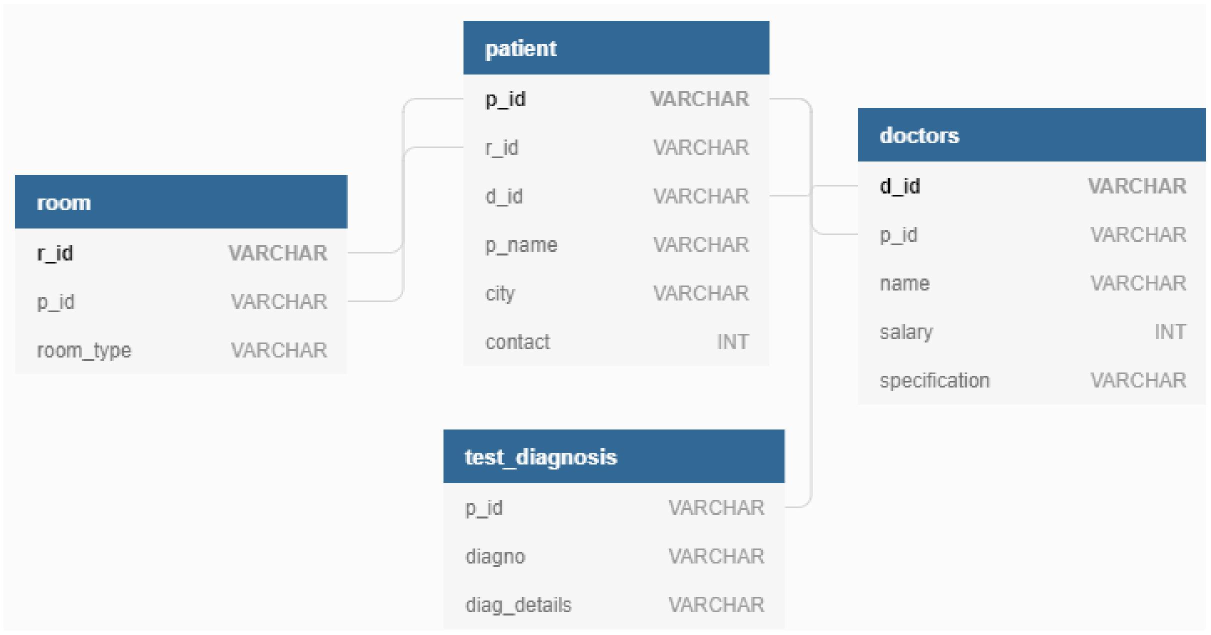
PATIENT (p_id, r_id, d_id, p_name, city, contact)
DOCTORS (d_id, p_id, name, salary, specification)
ROOM (r_id, p_id, room_type)
TEST & DIAGNOSIS (p_id, diagno, diag_details)

Assume the data types. Insert at least five values for each table.

```
CREATE DATABASE hospital;
USE hospital;

CREATE TABLE patient (
    p_id VARCHAR(5) NOT NULL,
    r_id VARCHAR(5) NOT NULL,
    d_id VARCHAR(5) NOT NULL,
    p_name VARCHAR(50),
    city VARCHAR(20),
    contact INT,
    PRIMARY KEY (p_id));

CREATE TABLE doctors (
    d_id VARCHAR(5) NOT NULL,
    p_id VARCHAR(5) NOT NULL,
    name VARCHAR(50),
    salary INT,
    specification VARCHAR(50),
    PRIMARY KEY (d_id));

CREATE TABLE room (
    r_id VARCHAR(5) NOT NULL,
    p_id VARCHAR(5) NOT NULL,
    room_type VARCHAR(20),
    PRIMARY KEY (r_id));

CREATE TABLE test_diagnosis (
    p_id VARCHAR(5) NOT NULL,
    diagno VARCHAR(5),
    diag_details VARCHAR(50));

INSERT INTO doctors
    VALUES ('d1', 'p1', 'Doctor A', 1000, 'Specification A'),
    ('d2', 'p2', 'Doctor B', 2000, 'Specification B'),
    ('d3', 'p3', 'Doctor C', 3000, 'Specification C'),
    ('d4', 'p4', 'Doctor D', 4000, 'Specification D'),
    ('d5', 'p5', 'Doctor E', 5000, 'Specification E');

INSERT INTO patient
    VALUES ('p1', 'r1', 'd1', 'Patient A', 'City A', 01),
    ('p2', 'r2', 'd2', 'Patient B', 'City B', 02),
    ('p3', 'r3', 'd3', 'Patient C', 'City C', 03),
    ('p4', 'r4', 'd4', 'Patient D', 'City D', 04),
    ('p5', 'r5', 'd5', 'Patient E', 'City E', 05);

INSERT INTO room
    VALUES ('r1', 'p1', 'ROOM A'),
    ('r2', 'p2', 'ROOM B'),
    ('r3', 'p3', 'ROOM C'),
    ('r4', 'p4', 'ROOM D'),
    ('r5', 'p5', 'ROOM E');

INSERT INTO test_diagnosis
    VALUES ('p1', 'd1', 'Details A'),
    ('p2', 'd2', 'Details B'),
    ('p3', 'd3', 'Details C'),
    ('p4', 'd4', 'Details D'),
    ('p5', 'd5', 'Details E');

ALTER TABLE patient
ADD FOREIGN KEY (r_id) REFERENCES room(r_id);
```

```
ALTER TABLE patient
ADD FOREIGN KEY (d_id) REFERENCES doctors(d_id);

ALTER TABLE doctors
ADD FOREIGN KEY (p_id) REFERENCES patient(p_id);

ALTER TABLE test_diagnosis
ADD FOREIGN KEY (p_id) REFERENCES patient(p_id);

ALTER TABLE room
ADD FOREIGN KEY (p_id) REFERENCES patient(p_id);
```

a. Draw a schema diagram for your table.



b. Use the above tables, attributes and demonstrate the working of primary key, foreign key, null value, table and column level constraints.

Primary key: Primary key is the unique identifier of a table's record. Primary key should be unique and not null.

Foreign key: Foreign key is used to create relation or connection between two tables. Also, the key which is foreign in one table, that key is used as primary key of another table.

Null Value: Null is used to represent the missing value.

Table and Column level constraints: Constraints are used to specify rules for the data. It can limit the type of data that can go into a table. If there is any violation between the constraints and the data action, this action is aborted. Table level constraints apply to the whole table whereas column level constraints only apply to a column. NOT NULL, DEFAULT, UNIQUE, PRIMARY and FOREIGN KEY are some of the example of mostly used constraints.

c. Demonstrate the below violation of constraints in relational database.

Domain Constraint
Entity Integrity constraint
Key Constraints
Referential Integrity

Domain Constraint: Domain constraints get violated because of inappropriate data type and also if data is not in the range of that domain. For example – If it is set that input value should be more then 10, and if someone enter 9 then domain constraint will be violated.

Entity Integrity Constraint: If we insert NULL in any primary key then entity integrity constraint gets violated.

Key Constraints: If we try to insert an already existing key in a table then key constraint gets violated.

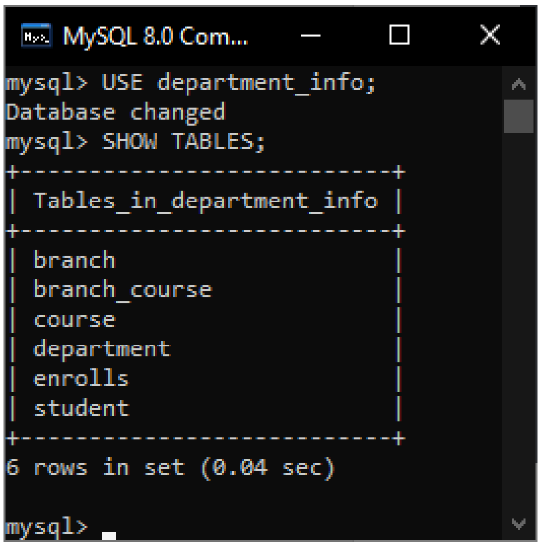
Referential Integrity: If we insert a value in foreign key, which is not present in primary key then referential integrity gets violated.

2. Build a Department database which consist of following information:

Student (Rollno, Name, Dob, Gender, Doa, Bcode);
Branch (Bcode, Bname, Dno);
Department (Dno, Dname);
Course (Ccode, Cname, Credits, Dno);
Branch_Course (Bcode, Ccode, Semester);
Enrolls (Rollno, Ccode, Grade);

Write Queries for the following:

```sql
CREATE DATABASE IF NOT EXISTS department_info;
USE department_info;


CREATE TABLE department (
    d_no VARCHAR(5) NOT NULL,
    d_name VARCHAR(50),
    PRIMARY KEY (d_no));

CREATE TABLE branch (
    b_code VARCHAR(5) NOT NULL,
    b_name VARCHAR(50),
    d_no VARCHAR(5) NOT NULL,
    PRIMARY KEY (b_code),
    FOREIGN KEY (d_no) REFERENCES department(d_no));

CREATE TABLE course (
    c_code VARCHAR(5) NOT NULL,
    c_name VARCHAR(50),
    credits INT,
    d_no VARCHAR(5) NOT NULL,
    PRIMARY KEY (c_code),
    FOREIGN KEY (d_no) REFERENCES department(d_no));
CREATE TABLE student (
    rollno INT NOT NULL,
    name VARCHAR(50),
    dob DATE,
    gender CHAR(1),
    doa DATE,
    b_code VARCHAR(5) NOT NULL,
    PRIMARY KEY (rollno),
    FOREIGN KEY (b_code) REFERENCES branch(b_code)
    );
CREATE TABLE branch_course (
    b_code VARCHAR(5) NOT NULL,
    c_code VARCHAR(5) NOT NULL,
    semester INT,
    FOREIGN KEY (b_code) REFERENCES branch(b_code),
    FOREIGN KEY (c_code) REFERENCES course(c_code));
CREATE TABLE enrolls (
    rollno INT NOT NULL,
    c_code VARCHAR(5) NOT NULL,
    grade INT,
    FOREIGN KEY (rollno) REFERENCES student(rollno),
    FOREIGN KEY (c_code) REFERENCES course(c_code));

INSERT INTO department
    VALUES ("D1", "CSE"),
    ("D2", "EEE"),
    ("D3", "IT"),
    ("D4", "ME"),
    ("D5", "IPE");
INSERT INTO branch
    VALUES ("B1", "B1_CSE", "D1"),
    ("B2", "B2_CSE", "D1"),
    ("B3", "B1_EEE", "D2"),
    ("B4", "B2_EEE", "D2"),
    ("B5", "B1_IT", "D3"),
    ("B6", "B2_IT", "D3"),
    ("B7", "B1_ME", "D4"),
    ("B8", "B1_IPE", "D5");

INSERT INTO course
    VALUES ("C1", "C1_CSE", 4, "D1"),
    ("C2", "C2_CSE", 4, "D1"),
    ("C3", "C1_EEE", 2, "D2"),
    ("C4", "C1_EEE", 3, "D2"),
    ("C5", "C1_IT", 4, "D3"),
    ("C6", "C1_IT", 4, "D3"),
    ("C7", "C1_ME", 1, "D4"),
    ("C8", "C1_IPE", 4, "D5");
INSERT INTO student
    VALUES (1, "S1", "2001-01-01", "M", "2005-01-01", "B1"),
    (2, "S2", "2000-01-01", "M", "2005-01-02", "B2"),
    (3, "S3", "2001-02-01", "F", "2005-01-01", "B3"),
    (4, "S4", "2001-03-01", "M", "2005-01-05", "B4"),
    (5, "S5", "2001-07-01", "M", "2005-01-01", "B5"),
    (6, "S6", "2001-02-05", "F", "2005-01-04", "B6"),
    (7, "S7", "2001-01-20", "M", "2005-01-06", "B7"),
    (8, "S8", "2001-05-01", "F", "2005-01-07", "B8"),
    (9, "S9", "2001-01-01", "M", "2005-01-01", "B1"),
    (10, "S10", "2001-02-01", "M", "2005-02-01", "B2"),
    (11, "S11", "2001-03-01", "F", "2005-01-11", "B3"),
    (12, "S12", "2001-04-01", "M", "2005-01-14", "B4"),
    (13, "S13", "2001-05-01", "M", "2005-01-13", "B5");

INSERT INTO branch_course
    VALUES ("B1", "C2", 1),
    ("B2", "C2", 2),
    ("B3", "C3", 3),
    ("B4", "C4", 4),
    ("B5", "C5", 5),
    ("B6", "C6", 6),
    ("B7", "C7", 7),
    ("B8", "C8", 1),
    ("B2", "C1", 1),
    ("B2", "C8", 2),
    ("B3", "C4", 3),
    ("B1", "C4", 4),
    ("B5", "C6", 5),
    ("B6", "C5", 6),
    ("B8", "C7", 1),
    ("B7", "C8", 8);

INSERT INTO enrolls
    VALUES (1, "C1", 4),
    (2, "C2", 4),
    (3, "C3", 4),
    (4, "C4", 5),
    (5, "C5", 4),
    (6, "C6", 6),
    (7, "C7", 4),
    (8, "C8", 5),
    (9, "C1", 8),
    (10, "C2", 9),
    (11, "C3", 4),
    (12, "C4", 7),
    (13, "C5", 6);
```

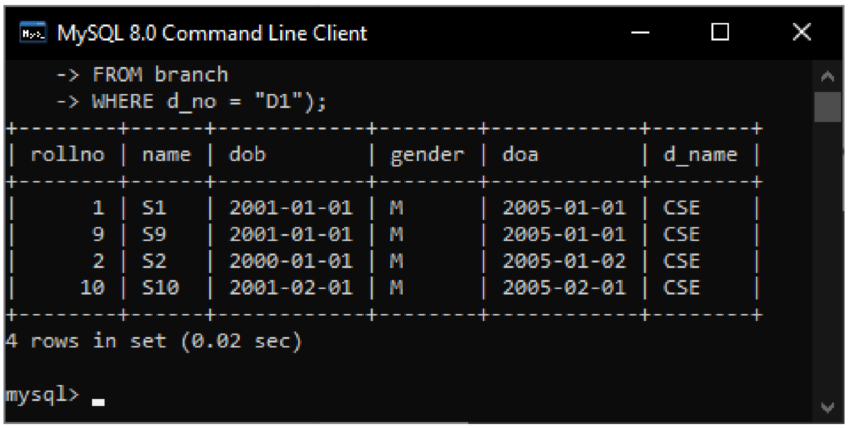


```
mysql> USE department_info;
Database changed
mysql> SHOW TABLES;
+--------------------------+
| Tables_in_department_info |
+--------------------------+
| branch                   |
| branch_course            |
| course                   |
| department               |
| enrolls                  |
| student                  |
+--------------------------+
6 rows in set (0.04 sec)

mysql>
```

a. Print the details of students who are from the same department.

```
SELECT s.rollno,
        s.name,
        s.dob,
        s.gender,
        s.doa,
        d.d_name
FROM student s
JOIN branch b
    USING (b_code)
JOIN department d
    USING (d_no)
```

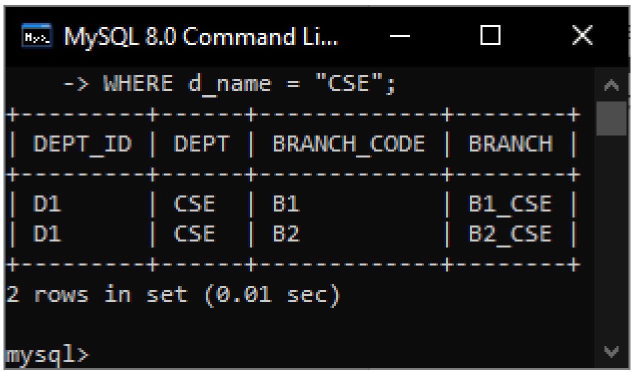
```
WHERE b_code IN (
    SELECT b_code
    FROM branch
    WHERE d_no = "D1")
```



```
MySQL 8.0 Command Line Client
    -> FROM branch
    -> WHERE d_no = "D1");
+--------+------+------------+--------+------------+--------+
| rollno | name | dob        | gender | doa        | d_name |
+--------+------+------------+--------+------------+--------+
|      1 | S1   | 2001-01-01 | M      | 2005-01-01 | CSE    |
|      9 | S9   | 2001-01-01 | M      | 2005-01-01 | CSE    |
|      2 | S2   | 2000-01-01 | M      | 2005-01-02 | CSE    |
|     10 | S10  | 2001-02-01 | M      | 2005-02-01 | CSE    |
+--------+------+------------+--------+------------+--------+
4 rows in set (0.02 sec)

mysql>
```

b. Get the details of branches under a particular Department;

```
SELECT d.d_no as DEPT_ID,
        d.d_name as DEPT,
        b.b_code as BRANCH_CODE,
        b.b_name as BRANCH
FROM department d
JOIN branch b
    USING (d_no)
WHERE d_name = "CSE"
```

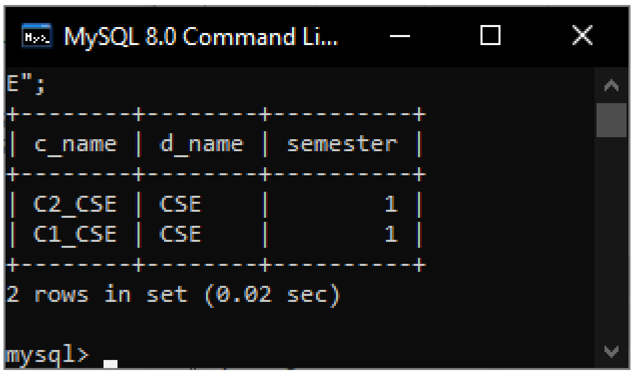


```
MySQL 8.0 Command Li...
    -> WHERE d_name = "CSE";
+---------+------+-------------+--------+
| DEPT_ID | DEPT | BRANCH_CODE | BRANCH |
+---------+------+-------------+--------+
| D1      | CSE  | B1          | B1_CSE |
| D1      | CSE  | B2          | B2_CSE |
+---------+------+-------------+--------+
2 rows in set (0.01 sec)

mysql>
```

c. Print the names of courses offered in a particular department in a particular semester;

```
SELECT c.c_name, d.d_name, bc.semester
```

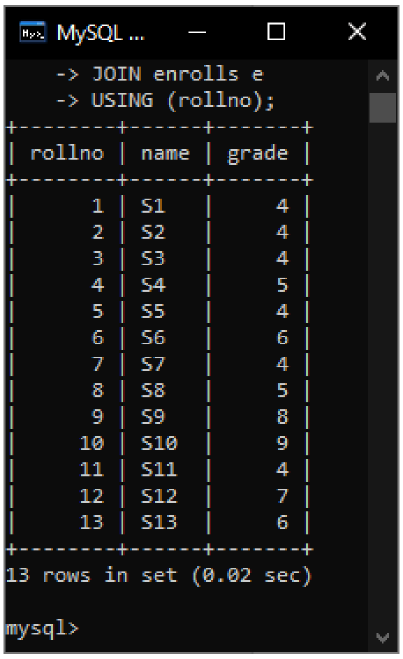
```sql
FROM branch_course bc
JOIN branch
    USING (b_code)
JOIN department d
    using (d_no)
JOIN course c
    using (c_code)
WHERE semester = 1 AND d_name = "CSE"
```



```
E";
+--------+--------+----------+
| c_name | d_name | semester |
+--------+--------+----------+
| C2_CSE | CSE    |        1 |
| C1_CSE | CSE    |        1 |
+--------+--------+----------+
2 rows in set (0.02 sec)

mysql>
```

d. Print the students roll no, Name and grades;

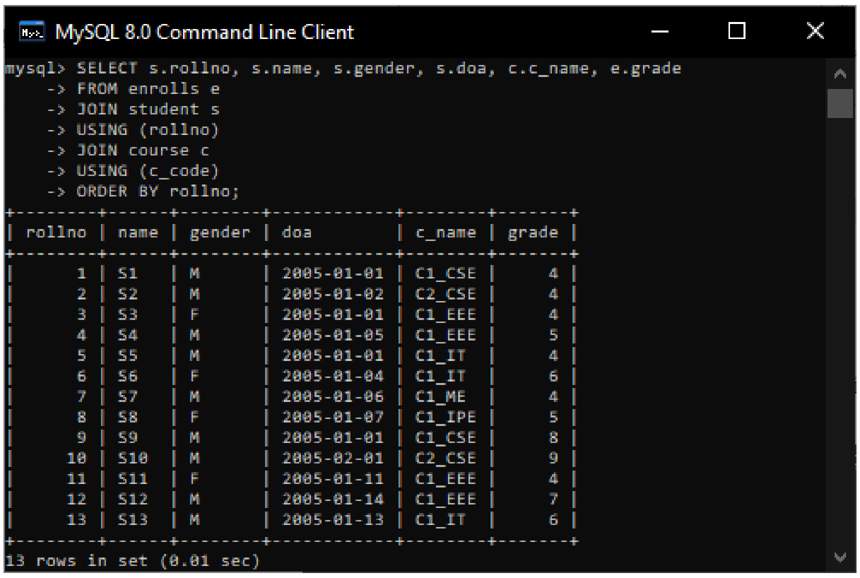
```sql
SELECT s.rollno, s.name, e.grade
FROM student s
JOIN enrolls e
    USING (rollno)
```



```
    -> JOIN enrolls e
    -> USING (rollno);
+--------+------+-------+
| rollno | name | grade |
+--------+------+-------+
|      1 | S1   |     4 |
|      2 | S2   |     4 |
|      3 | S3   |     4 |
|      4 | S4   |     5 |
|      5 | S5   |     4 |
|      6 | S6   |     6 |
|      7 | S7   |     4 |
|      8 | S8   |     5 |
|      9 | S9   |     8 |
|     10 | S10  |     9 |
|     11 | S11  |     4 |
|     12 | S12  |     7 |
|     13 | S13  |     6 |
+--------+------+-------+
13 rows in set (0.02 sec)

mysql>
```

e. Print the details of students who are enrolled for different courses.

```
SELECT s.rollno, s.name, s.gender, s.doa, c.c_name, e.grade
FROM enrolls e
JOIN student s
    USING (rollno)
JOIN course c
    USING (c_code)
ORDER BY rollno
```



MySQL 8.0 Command Line Client

```
mysql> SELECT s.rollno, s.name, s.gender, s.doa, c.c_name, e.grade
    -> FROM enrolls e
    -> JOIN student s
    -> USING (rollno)
    -> JOIN course c
    -> USING (c_code)
    -> ORDER BY rollno;
+--------+------+--------+------------+--------+-------+
| rollno | name | gender | doa        | c_name | grade |
+--------+------+--------+------------+--------+-------+
|      1 | S1   | M      | 2005-01-01 | C1_CSE |     4 |
|      2 | S2   | M      | 2005-01-02 | C2_CSE |     4 |
|      3 | S3   | F      | 2005-01-01 | C1_EEE |     4 |
|      4 | S4   | M      | 2005-01-05 | C1_EEE |     5 |
|      5 | S5   | M      | 2005-01-01 | C1_IT  |     4 |
|      6 | S6   | F      | 2005-01-04 | C1_IT  |     6 |
|      7 | S7   | M      | 2005-01-06 | C1_ME  |     4 |
|      8 | S8   | F      | 2005-01-07 | C1_IPE |     5 |
|      9 | S9   | M      | 2005-01-01 | C1_CSE |     8 |
|     10 | S10  | M      | 2005-02-01 | C2_CSE |     9 |
|     11 | S11  | F      | 2005-01-11 | C1_EEE |     4 |
|     12 | S12  | M      | 2005-01-14 | C1_EEE |     7 |
|     13 | S13  | M      | 2005-01-13 | C1_IT  |     6 |
+--------+------+--------+------------+--------+-------+
13 rows in set (0.01 sec)
```